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## ASSESSMENT OF MATURITY AND DISTRESS IN THE STAR-WAVE-TESTS OF FIVE-YEAR OLDS

*Dafna Yalon*

**Abstract:** Research was performed to assess a school suitability by means of the Star-Wave-Test (SWT) for an entire town of Israeli kindergarten children. Maturity and distress scores were developed to quantify the functional and expressive aspects of the SWT and to examine the predictive value of the SWT for identifying potential school difficulties. Follow-up research four to five years after the initial testing validated the maturity and distress scores as being predictive relative to long term academic performance and social skills.

Our first aim in this project was to quantify both the functional and the expressive aspects of the SWT. This quantitative method could be used as a screening procedure to establish school maturity in whole kindergartens, and eventually in all of the five-year-old children of the town. Up to now the SWT was frequently used in an intuitive manner as a means to detect school immaturity during the last kindergarten year. To assess this functional aspect we have developed a numerical scale that gives a range of levels of maturity and immaturity.

This maturity scale determines the child's ability to understand a complex task, transform it into mental images and produce the desired graphic picture of form over motion. However, prediction of academic success is not solely dependent on these skills. Children might be too troubled to study and might fail due to their organic problems, environmental difficulties and personal stresses. The influence of such factors could be defined by developing another scale for degree of distress that is based on quantification of the expressive content of the drawing. These two scales yield two figures, generally between one and ten points each. In rare cases distress values were slightly higher. Thus, every child's maturity and distress degrees can be recorded and rechecked in follow-up studies. In screening whole kindergartens the children with low maturity and high distress values can thus be discovered and helped a year before school begins.

The basis of this paper, not including the "Follow-up Results," was presented at The Star-Wave-Test in Research and Experience International Symposium in Prague, September, 1994. It describes parts of prize-winning research supported by an award of the Benor Fund and conducted in a 1992-1997 collaboration with Chana Ben-Zion.

## SCORING MATURITY

Maturity scores can go up to ten points. In the spirit of Avé-Lallement,<sup>1</sup> we always look for the highest potential, so that only the best elements are considered. Sometimes even strokes that have been erased can add to the score. The total score is based on six demands with the following number of points for each.

### Task Understanding

- 2 — stars placed over the waves with different recognizable forms
- 2 — relevant additions (fish, boat, moon, etc.)
- 1 — stars only
- 1 — waves only
- 1 — just one star, huge and centrally placed
- 1 — irrelevant additions (flower, butterfly, sun, etc.)
- 0 — another drawing
- 0 — an empty sheet

### Form of Stars

- 2 — at least one well-formed angular star
- 1 — a planned angular form, with malformations due to motion
- 1 — round stars, good circles
- 0 — form disturbances
- 0 — scribbles, no forms
- 0 — lack of stars

### Motion of Waves

- 2 — at least one rhythmically flowing wave
- 1 — linear or angular (zigzag) strokes
- 1 — arcades
- 1 — other static forms
- 0 — motion disturbances (sometimes only in the waves)
- 0 — blackening of wave-area
- 0 — lack of waves

### Spatial Arrangement

- 2 — stars placed over waves with good macro-structure
- 2 — stars over waves with stars placed in a row (typical for children at age five)
- 1 — upper part with stars, lower part empty
- 1 — upper part empty, lower part empty with waves
- 1 — disturbed macro-structure
- 0 — spatial problems: waves over stars or side by side
- 0 — stars all over the sheet

0 — waves all over the sheet

0 — stars and waves on one side of the frame only

### Frame Recognition

1 — drawing within the frame or one deviation

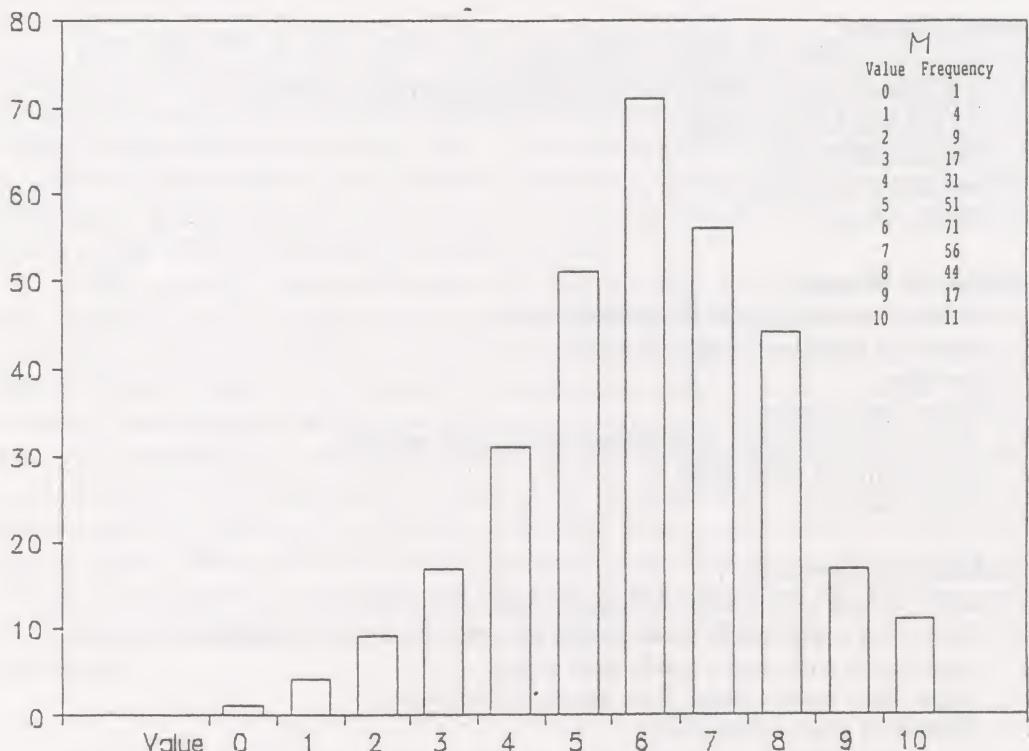
0 — two deviations or more outside the frame

### Qualitative Level

1 — auxiliary qualities (persistence, ideas, diligence, self assurance, or any trait that might help coping in school)

0 — lack of such auxiliary qualities or even occurrence of disturbing factors (indolence, giving up, slackness, dullness, fantasm, etc.)

Maturity was scored according to these instructions in 413 tests of five-year-olds in an Israeli city.



**Figure 1: Frequency distribution of maturity values**

The frequency distribution of observed values (Figure 1) shows that the mean value was 6 points (5.978). Therefore, children that obtain less than that can be considered below-average in their potential for academic success. Reliability, calculated by repeated scoring of maturity by the same judge, was 0.96. Inter-judge reliability was 0.87.

## **DISTRESS**

Signs of distress were very well established in handwriting by Avé-Lallement.<sup>2</sup> We chose to transform the list of these alarm signals to the SWT. We also included the four categories of disturbed pencil-stroke and disturbed plane-treatment modes (hatching, roughing and blackening), as described in the book about the SWT.<sup>3</sup> In order to determine distress we prepared a check list of these indicators that is arranged in a different order than usual. Instead of analyzing by the three pictures of handwriting, we combined the indicators etiologically to try and construct little syndromes.

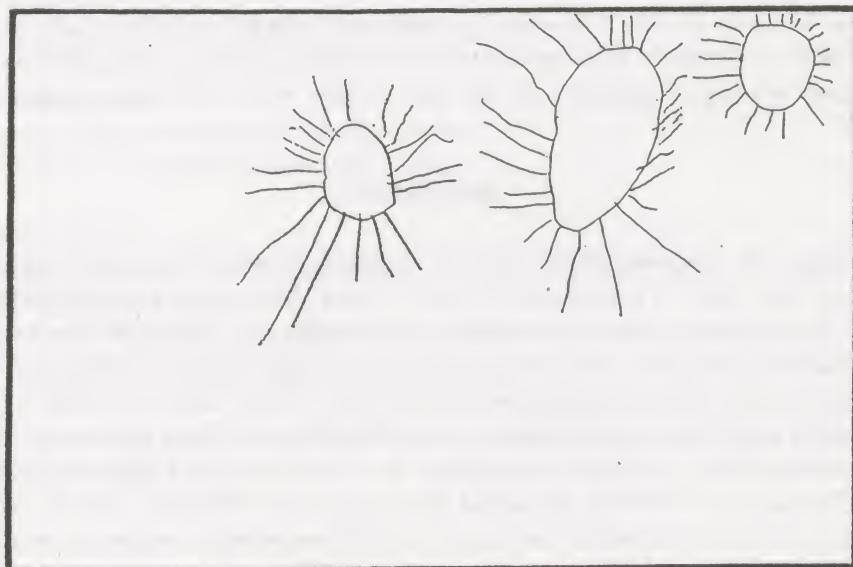
The signs of distress discussed here may have different origins. They may appear as a result of physical disorders like soft neurological signs, muscular tonus disturbances, hormonal imbalances, tiredness and fever. Graphomotoric problems or a delay in development will be included in this category. At age five a problematic pen-grasp can often denote deeper organic difficulties. We assume that children with organic disorders are randomly distributed among the different kindergarten populations. This assumption could prove wrong or over-simplified.

Signs of distress may also result from environmental neglect, or unfavorable outside conditions like divorce or death of parents, sexual abuse, etc. These could also be the result of inner psychological problems, like low self-esteem, anxiety, over-protectedness and perfectionism, causing distress and hindering progress. Therefore, signs of distress that appear in a graphic specimen will always denote that the bearer suffers from something, at least at that specific time and place. Suffering is very subjective and has no bearing on the objective severity of the problem.

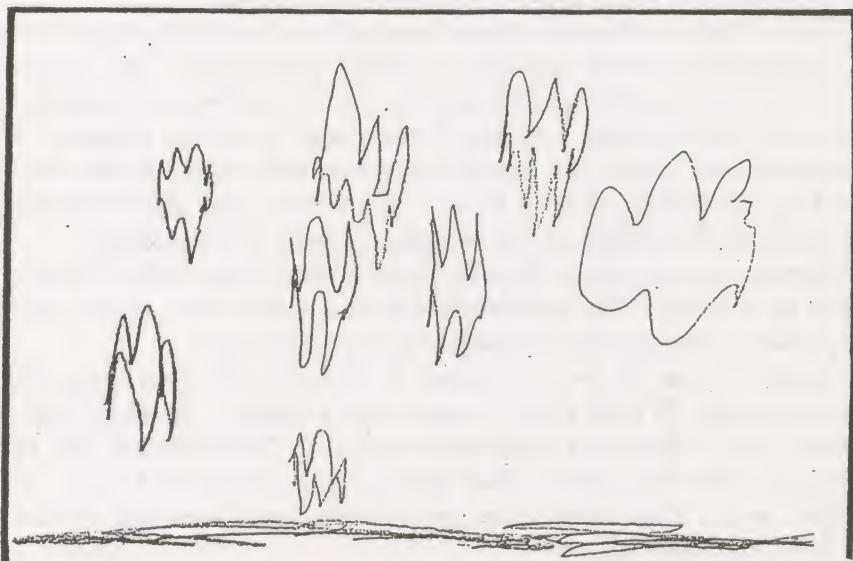
However, the opposite is not true. Lack of these signs will not denote that the subject has no problems. The children tested may suffer from severe temporary or habitual problems without ever revealing them in their tests.

Figures 2a and 2b were produced by five-year-old twin boys, whose elder brother is terminally ill with cancer causing the parents to be away from home for long periods. One of the twins reveals distress in his SWT (Figure 2a), receiving 8 points because of his stiff motion, slack stroke, narrow forms and empty spaces. His twin brother, on the other hand, produced a fairly untroubled test (Figure 2b) with only four points for distress.

Although it is obvious that Figure 2b also reveals some distress, as one can see from the tense motion of the water. It is not a real blackening since it is not stiff



**Figure 2a:** Twin brother, "silent" distress.



**Figure 2b:** Twin brother, "noisy" distress.

and heavy enough, and there is no fixation. Many children "color" that way in pencil drawings. This child has mild "noisy" distress, somewhat problematic behavior; he draws attention to it. In fact, he received a lot of psychological help once his brother died. He cried, screamed and misbehaved.

His twin (Figure 2a), has what we call "silent" distress, which is by no means less painful. He does not show his pain, never talks about it, never even cried when his brother died. He remained the best pupil in the class. His test is very stiff, yet the stroke is slack, as if he is wearing heavy armor. The water area is empty; he avoids talking about his emotions. Meanwhile, he succeeds in playing the hero, but at a price. He is cramped. This boy does not show any symptoms of anger, but knowing the child and his family well, we are concerned that he accumulates fear and anger and that problems can be expected at a later stage.

We also find cases in which psychological distress is represented by projective means only, and symbols like a sinking boat, drowning people, a life-saver post, a sun, and so forth may appear. Such symbolic contents will not be considered in our graphological screening. Cases like these reveal that the occurrence and degrees of distress found graphologically are in fact lower than their actual rate.

## SCORING DISTRESS

Distress is assessed by a check list of alarm-signals. These graphic indicators have to be evaluated for both their frequency and their intensity.

2 points — strong or frequent appearance

1 point — weak or rare appearance, but at least twice

Strokes are considered disturbed when their occurrence is dominant (2 points) or frequent (1 point), but not when they appear rarely or if they are due to asymmetrically sharpened pencils. Stroke disturbances will generally be seen both in stars and waves. Stroke disturbances can go up to 4 points only. They include distress signs numbers 2, 3, 5, 6, 11 and 12 below. These can be divided among 2 or 3 categories. This limitation avoids putting too much emphasis on organic problems. Disturbed motion can be both slack and contracted, sometimes accompanied by a slack stroke. In this case, both types of motion are graded with 1 point each.

### Primary Signs (Weakness)

Primary signs occur spontaneously and directly reflect the problems of the test taker. Physical and mental weakness can be reflected by the following.

**1. Slack motion** — According to Pophal, it is the first degree of tension (out of five). There is a lack of healthy tension and dynamism in the dragging motion. It reflects helplessness and a lack of persistence and fighting spirit.

**2. Slack, non-elastic stroke** — This is a more severe disturbance, in which the stroke itself has neither elasticity nor homogeneity and appears lifeless. The child is unable to adjust to normal requirements due to inner weakness, exhaustion and unstable moods.

**3. Fragile stroke** — This is a disturbed stroke that is too delicate, very thin and lacks pressure. It looks like a narrow and shallow water stream. Lack of stamina may cause irritability and nervousness. Vulnerable children may behave aggressively out of their fear.

**4. Stroke interruptions (uncontrolled breaks)** — Unreasonable interruptions due to insufficient coordination can have organic origins or else be caused by low self-esteem, paralyzing fears and frustrations. Sometimes these breaks are accompanied by soldering joints in a secondary effort to repair and hide the failure.

#### **Primary Signs (Uncontrolled Drives)**

The second group of spontaneous disturbances is caused by uncontrollable drives. The controls are insufficient, regardless of the intensity of the drives.

**5. Spongy stroke** — The spongy stroke has very weak pressure and is too wide and smeary. Its stream looks like dirty marshes, with no real boundaries. The spongy stroke denotes insufficient ego boundaries and dependency. The child follows leaders in search for warmth and intimacy at any price.

**6. Crude stroke** — The crude stroke looks like the Amazon River, with its uncontrollable energies. The wide stroke has extremely strong pressure. This immense vigor can be caused by lack of graphomotoric maturity or by coarse, violent and uncontrollable drives. The child can be rude, insensitive, impulsive and aggressive.

**7. Hyperkinesis** — The drawing reveals too much motion which may impair both form and organization. The stormy child lacks self-control, is irritable and disturbs others. He is an under-achiever due to insufficient concentration.

#### **Secondary Signs (Tension)**

Secondary signs are reactional. Spontaneity is lost and high tension and caution prevail to cope with undue pressures and high demands exerted on the child.

**8. Narrowness** — This is reflected in contracted motions which do not enable wide, extending forms. Narrow angles of the stars and short wavelengths are a result of such tensions.

**9. Cover Strokes** — These are extremely narrow unconscious motions, which signify fear, being unable to "walk a single step." Frustrations lead to a loss of initiative; insecurity causes the need to lean on somebody else.

**10. Contracted motion** — According to Pophal, the tension degree is number 4, and even 5. This motion, which can be seen in various ways in the waves or in a scribbled sky, becomes stiff and cramped. Instead of a free elastic motion the waves have forms like arcades, angles, zigzags and contracted garlands. Tension is very unnatural for children and its existence reveals restraints, stress and worries.

**11. Tense, non-elastic stroke** — Here there is a loss of stroke elasticity due to hyper-tension. It is a sign of distress which is of extreme concern especially in its rare occurrence in children. The stroke seems like distorted and broken barbed wire. It signifies feelings of fear, deprivation and frustration, a paralyzing tension. Permanent reactions of fight or flight lead to antagonism and failure.

**12. Hard stroke** — Rational compensation can also be seen in the hard stroke that cuts the paper like a canyon cuts the desert mountains, in a very deep but narrow path. This stroke reveals emotional deprivation compensated by cold, one-sided rationalism which can lead to cruelty and hate.

**13. Corrections by retouching and erasing** — These are conscious, but often compulsive. The child feels failure in executing the desired forms and puts a great effort into correcting them. He either erases unsuccessful strokes or unnecessarily retouches and redraws them. On the one hand, this behavior shows insecurity and obsessive experiencing of failure and guilt. On the other hand, a true effort is made to repair the damage, but also to hide mistakes.

**14. Fixational blackening** — Tense and heavy strokes are compulsively drawn to fill in specific or even large areas. Blackening always denotes tension and fixation on problems. Fears, aggression and hostility may be evident.

#### **Secondary Signs (Overcompensating Control)**

These signs reveal that the child's tension is geared toward over-adjustment to his surroundings. The child is too good, but cannot develop autonomy or find happiness.

**15. Very regular arrangement** — The stars and waves are arranged according to fixed rules, in a very strict and mechanical order. Regularity by children is rare, and is not considered as such when kindergarten children arrange their stars in a typical

nice row. When very regular, the child behaves like a robot, according to expectations and not out of free will. Creativity and joy give way to compulsiveness and duty.

**16. Stylization, form interpretation of the test** — These are stylized decorative forms that are static, accurate, artistic or manneristic. These are also rare in young childhood. This artificial beauty symbolizes the desire to prove success and originality. The child assumes that it can be loved and recognized for his special achievements only and adjusts to adult expectations.

**17. Hatching of the plane** — Specific areas are filled with parallel linear strokes. The emotional need to color the plane is rationally controlled. Free expression of feelings is not allowed or even repressed.

#### **Maladjustment to the Environment**

Lack of orientation, loneliness and problematic adaptation may lead to a disturbed macro-structure of the test. These disturbances often reveal temporary or habitual difficulties to adjust to a specific surrounding. The same child may show no problems in another environment.

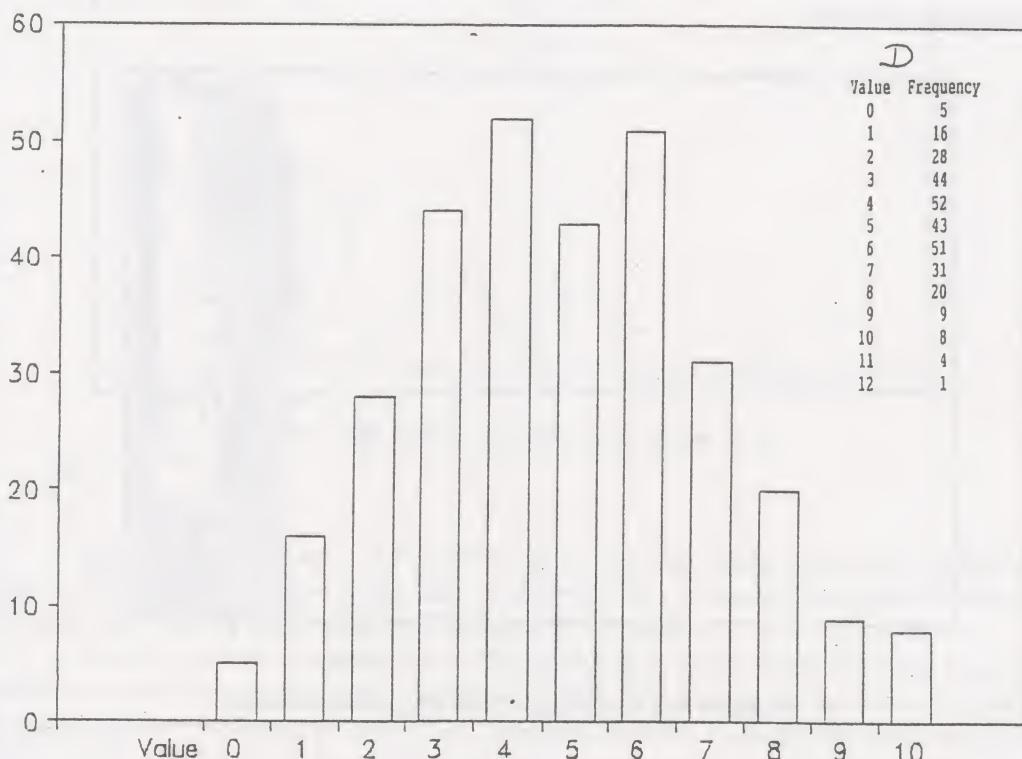
**18. Disrupted space, disharmonious, empty areas** — It will be only considered when there is enough room for another star. The result seems disharmoniously empty. The prevailing vacuum reflects deprivation, lack of contacts, feelings of loneliness and rejection. Thinking continuity may also be impaired.

**19. Entanglements** — The test is overcrowded with elements. At least two points of clashing or overlapping stars or waves exist. The child has problems in his social adjustment, is confused and does not recognize his or her place. This may be due to subjective reality based on egocentric thinking or irritation and confusion due to over-stimulation.

**20. Final blocking** — Specific breaks or even backward tendencies occur at the end of a motion. This phenomenon is very rare in the SWT. Specific blocks at this crucial moment are symptomatic of a last-minute fear of any attachment, trust and responsibility in personal relations.

**21. Roughing of the plane** — The texture of the page looks rough, torn and disturbed due to disharmoniously and nervously scattered strokes. Chaotic tension and conflicts hinder proper social adjustment. The child tries in vain to control the emotional flood.

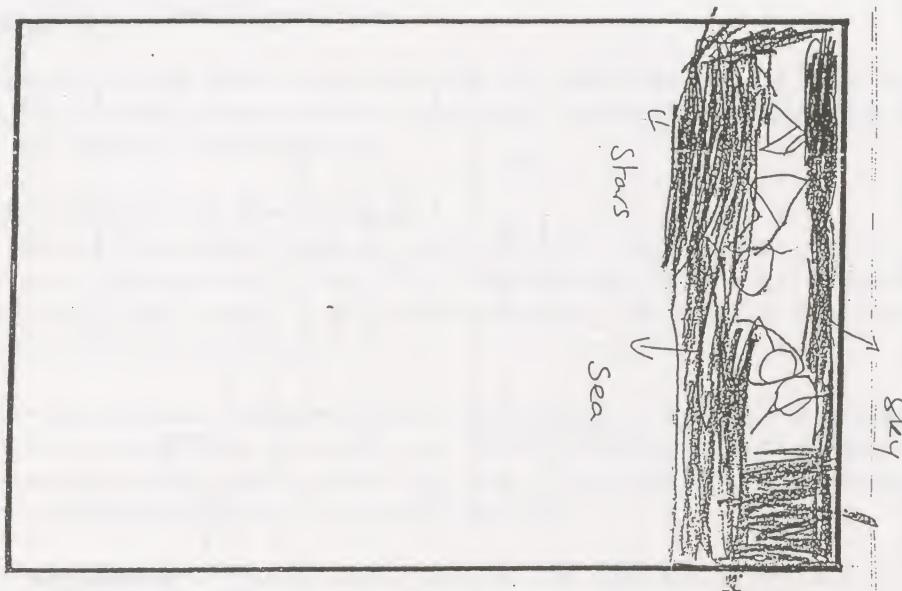
Theoretically a test taker can obtain up to 42 points for the distress scale if all 21 alarm indicators were present. However, reality shows that no child obtained more than 12 points. Using this check list, we examined the same 413 five-year-old children who were scored for maturity.



**Figure 3: Frequency distribution of distress values.**

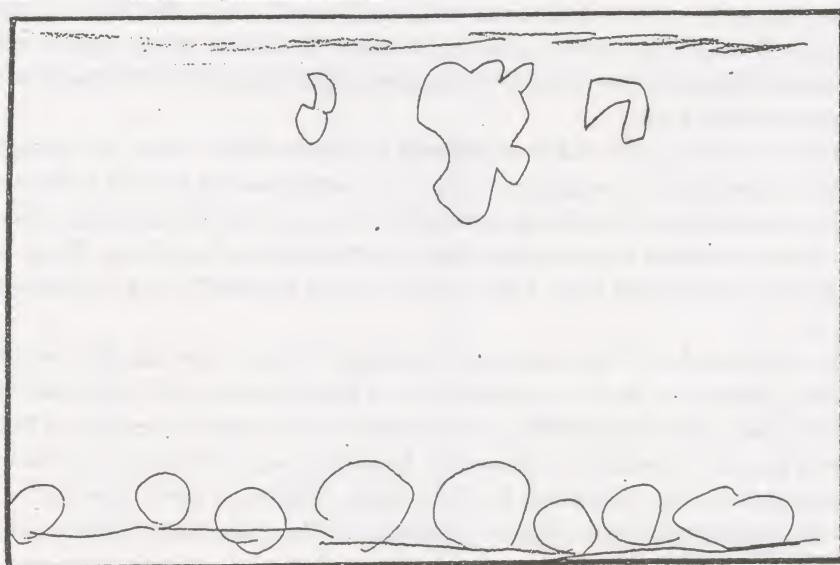
The frequency distribution of the distress scores in our population are presented in Figure 3. The mean value was found to be 5 points (5.012). Therefore, children with distress scores of six and more points are considered at a higher than average risk. Reliability studies performed on repeated scoring of distress by the same judge was 0.79. Inter judge reliability was 0.62. Screening for 21 indicators in a few hundred tests can be very laborious. In the future we must simplify the list by com-

bining a few parameters, like one heading for "stroke disturbances" instead of the present six specific categories of disturbed strokes. The idea of distress indicators is based on the fact that they are temporary, appear at a time of a crisis and disappear when it is overcome. This criterion can only be established in a follow-up study. In our research we included a few comparisons of tests performed by the same child under various conditions.



**Figure 4a: Kindergarten boy, earlier test.**

For example, this boy performed the first test in his kindergarten (Figure 4a) and a month later he did it again with a special education teacher that works with him twice a week (Figure 4b). With her he feels happier in his space, is less involved in fixational blackening, and his stroke is less erratic. The distress decreased from 7 points to 4. In this case it is evident that under more protective conditions the performance improved as well. The child was not antagonistic to the task any more, and increased from 1 point to 6 points on the maturity scale.



**Figure 4b: Kindergarten boy, later test.**

We also checked again 10 children who repeated kindergarten. For 6 out of these 10 children there was a decrease in distress, but 3 showed increased distress. The average value in this group was lowered by 1.7 points.

Maturity values increased for 8 of those children. The average increase was 1.6 points per child. It is worthwhile mentioning that this change in value is relatively small because we deal here with children for whom an extra kindergarten year was necessary, such as children with specific learning problems or who are slightly retarded.

On the other hand, for 4 of the "normal" children who were tested at age four and again at age five, there was found an average increase of 2.75 points in maturity. Such a marked improvement is expected in this critical period. We also found a decrease of 2 points of distress, probably reflecting their higher self-esteem as graduating children relative to the previous year, in which they were much younger than most of their classmates. We hope to be able to improve their performance of screening by repeated tests also in the middle and end of the year for those children who showed low maturity, to see if these results reveal low mental capacity or delayed graphomotoric maturity, and also for the children with high distress values, to detect permanent constitutional problems versus temporary psychological burdens.

Screening for signs of distress can yield much more statistical information. For example, By adding up the number of cases in which every sign occurred, we obtained a list of frequencies of these indicators, denoting the rate of the specific problems connected with them.

When screening all 413 five-year-old children of the town, we actually found what we had expected: the incidence of the overcompensating control indicators (overregularity, stylization and hatching) are still very rare since the children are much too young to have developed these compulsory compensational methods. Final blockings are typical for handwriting only. They are so rare in the SWT that in future they can be ignored.

We plan to extend this study and perform a factor analysis for specific combinations. For instance, to look for correlations of hyperkinesis with hyperactivity, slack motion and stroke with hypotonicity, crude stroke with aggression, and so forth. Since the children are still currently in school we have free access to their psychological files and we can continue the validation for our results relative to their academic success as well as their psychological and organic problems for the remainder of their school years.

## FOLLOW-UP RESULTS

The maturity and distress scores are an effective quantitative tool, defining every child's position among his peers, in respect of his functional ability and present psychological well-being. Children with low maturity and higher than average distress scores are more prone to failure and might face greater difficulties at school and among their friends.

The SWT scales can also be used in the evaluation of whole kindergartens. The average numerical values of different schools can be compared, providing information about the general abilities and problems of their pupils. The standard deviation in every kindergarten depicts the degree of homogeneity versus heterogeneity of its pupils. By collecting this data in all 13 kindergartens of the town we were able to show marked differences in both the overall level and heterogeneity among them. It was evident that there are clusters of kindergartens with similar results, located in the same area, and that the significant differences between the average scores of these clusters reflect, to a great extent, different levels between well-established and weaker socioeconomic neighborhoods. Thus, it is easy to establish which kindergarten calls for additional curricular help (lower than average maturity) or for more involvement of psychologists (higher distress values). It is suggested that the average SWT scores be used as a means of comparison among populations of five-year-old children in various vicinities, towns, districts and even countries in order to perform cross-cultural research.

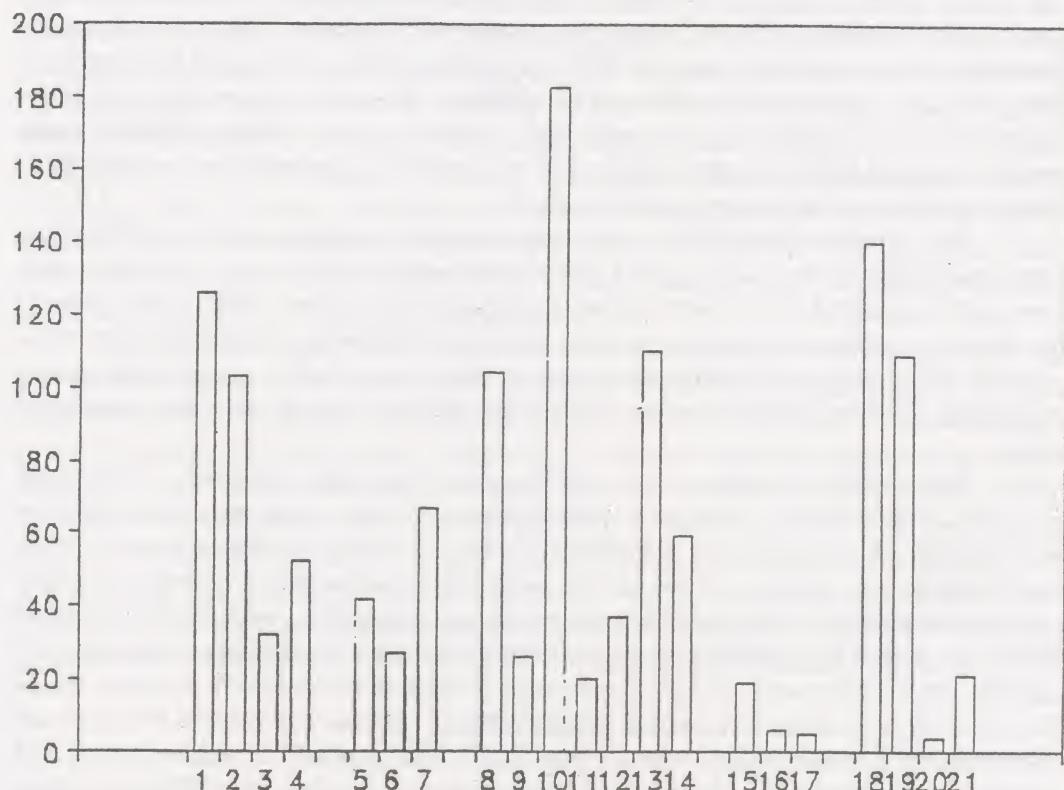


Figure 5: Frequencies of various distress signs at age five.

The overall results of a whole kindergarten can be drawn on a graph of maturity versus distress scores, providing a map of the kindergarten. These maps can help the teacher to divide the children into groups with similar abilities and needs. Moreover, when administering the SWT at the beginning of the last kindergarten year, the maps enable quick screening for children whose results are the most problematic (very low maturity and very high distress scores). Those children could receive targeted help throughout the academic year to overcome their specific difficulties and become better prepared for school.

The validity of the SWT scores as a means for prognosis of school difficulties was established by the psychological educational services of the town. Children that were sent in April/May by their teachers (independently of their SWT achievements) for diagnosis of their suitability to start school the following September were compared to the majority of children for which no doubt existed. The tested children had significantly lower maturity scores and higher distress values than the non-tested group.

The predictive value of the SWT scores was also validated in follow-up research on 83 children. At the end of their third or fourth school year those children were graded on scales of 1 to 4 by their teachers for their academic success, their social ability and behavior. These grades were correlated with the maturity and distress scores obtained from the SWTs they had performed five years earlier. We were able to prove that the maturity score was highly predictive for academic achievements and for social adjustment, and also somewhat predictive of the child's behavior. Since the maturity scale is developmental, we can assume that more developed five-year-old children have a better chance to prove their skills both in academic achievements and in their social relations in later years. The predictive value of the SWT was higher than that of a combination of other relevant data (whether the child was psychologically tested, spent or was recommended for an extra year in kindergarten, or was a new immigrant). The wave quality had the highest predictive value both academically and socially, while success in drawing stars does not show any significant correlation with those later achievements.

We can conclude that the maturity scale of the SWT is a very efficient predictive tool, enabling early screening for the long-term dysfunctions in both learning and socialization. It is striking that the "emotional intelligence," as depicted in the waves, is the most relevant factor for success in friendships but also in scholastic achievements. This finding is in line with the overruling role of the "emotional intelligence" as discussed by Daniel Goleman.<sup>4</sup> It also confirms Avé-Lallemand's findings that school achievements are best predicted by the healthy elastic stroke.

It is interesting to note that the distress scale was highly predictive for academic failure and somewhat predictive for social skills. Since the signs of distress that constitute this scale generally have only a temporary appearance they were not

expected to show a marked influence after 4 to 5 years. The observed correlation can mean that a part of the distress is not diminished due to its organic nature (about 10% of organic problems are expected in the population) or has transformed to habitual behavioral patterns. It may also suggest that the distress scale is contaminated with developmental factors, which is probably due to the fact that some children show delayed graphomotoric maturity. This contamination can contribute to some overlapping in developmental aspects of the distress scale. A thorough investigation of the individual effect of every distress sign, based on tests performed at various ages of these children (in kindergarten, first and fourth grade) is still in preparation. Such differentiation could better specify their origins, whether due to organic, developmental, personality or temporary disfunctions.

A very important finding is that neither the maturity nor the distress scales correlated with the child's behavior at school. This can be explained by the fact that some behavioral problems like compulsiveness, passivity or shyness would not receive negative grading by the teachers. However, it is well established that graphic projective tests show the motivations and reasons for a given behavior, but not the behavior itself. As graphologists we must always keep in mind that it is quite presumptuous to tell what the test taker actually does in his life. We should confine ourselves to ascertaining why he acts in a certain manner, what his potentials are, what is bothering him, hindering his productivity and disturbing his peace of mind. The SWT has proven to be a very efficient tool for such an evaluation in preschool children.

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